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The Use of Vertical Seismic Profiling for Remedial Design

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Beginning in 1992, Lawrence Livermore National Laboratory has been researching the potential use of shallow high resolution seismic reflection and vertical seismic profiling (VSP) technologies, and their application in delineating shallow subsurface features (less than 300 feet deep) which may influence contaminant flow and transport. The technology has been field tested in both two and three dimensional applications, and at sites with differing lithologies, geologic settings, and depths of unsaturated zone.

Results indicate that sites with a shallow water table and relatively consolidated and homogeneous subsurface geology provide the highest quality data for environmental applications. VSPs are not only more cost-effective in shallow investigations than surface seismic, but are directly tied to existing wells, can be implemented in urban environments where cultural effects, such as buildings and traffic disrupt conventional surface acquisition, and can provide valuable subsurface information for the implacement of extraction and monitoring systems. By the application of radial designs of the VSP acquisition, we can infer the spatial distribution of subsurface geological features such as channels, and this has lead to the implacement of extraction wells yielding higher flow rates than previously encountered.

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